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# First record of the family Gynodiastylidae Stebbing, 1912 (Crustacea: Malacostraca: Cumacea) from Antarctic waters with the description of *Gynodiastylis jazdzewskii*, a new species

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*Abstract.*—An adult male of an undescribed gynodiastylid cumacean was collected in a Menzies trawl sample taken at a depth of between 388 and 399 m in the Ross Sea (76°01.5′–76°01.0′S, 179°49.9′–179°52.3′E) during February 1972. The specimen, which had lost its third maxillipeds and the last four articles of the first pereopods, is placed in the genus *Gynodiastylis* Calman, 1911. *Gynodiastylis jazdzewskii*, new species, the first member of its family reported from Antarctic waters, can be distinguished from the 59 previously described species of *Gynodiastylis* and members of the other five gynodiastylid genera by a combination of characters, including the finer, more irregularly wavy, longitudinal ridges, and the length and setation of the telson, on the carapace, the shape and terminal setation of the telson, the length of telson in relation to that of the last abdominal somite and uropodal peduncles, and the setation and relative length of the uropodal rami.

An examination of the Cumacea collected by the R/V *Eltanin* in the Ross Sea, revealed a single adult male specimen of an undescribed gynodiastylid. The specimen was damaged (third maxillipeds and the four distal articles of the first pereopods missing), but can be reliably assigned to the genus *Gynodiastylis* Calman, 1911 and represents the first record of the family Gynodiastylidae from the Antarctic region.

## *Gynodiastylis jazdzewskii*, new species
Figs. 1–2

*Material examined.*—Holotype: adult male (USNM 243765); Ross Sea, between 76°01.5′S–179°49.9′E and 76°01.0′S–179°52.3′E; depth 388–399 m; 08 February 1972; Menzies trawl; R/V *Eltanin*, Cruise 51, Sta. 5761; Coll., Smithsonian Oceanographic Sorting Center.

*Diagnosis.*—Gynodiastylidae. Adult male. Carapace with numerous (approximately 17) fine, irregular, wavy, longitudinal ridges, many coalescing (especially anteriorly). Exopods on pereopods 1–4. Telson linguiform, distinctly longer than sixth abdominal somite, extending to distal ¾ of uropodal peduncle, armed with 2 distinct, closely set, terminal spine-setae. Uropods relatively long, attenuated; peduncle with 4 spine-setae along inner distal margin; endopod and exopod with 2 articles, endopod (excluding terminal setae) slightly longer than exopod, exopod with 2 long terminal setae, innermost about as long as rest of exopod, outer seta about ⅔ length of inner one.

*Description.*—adult male holotype (Fig. 1), carapace length 0.9 mm, total length 3.2 mm. Carapace nearly ⅓ of total length; having numerous (approximately 17) fine, irregular, wavy, longitudinal ridges (or striations), many coalescing anteriorly; ocular lobe well-developed, eyes obscure, unpig-

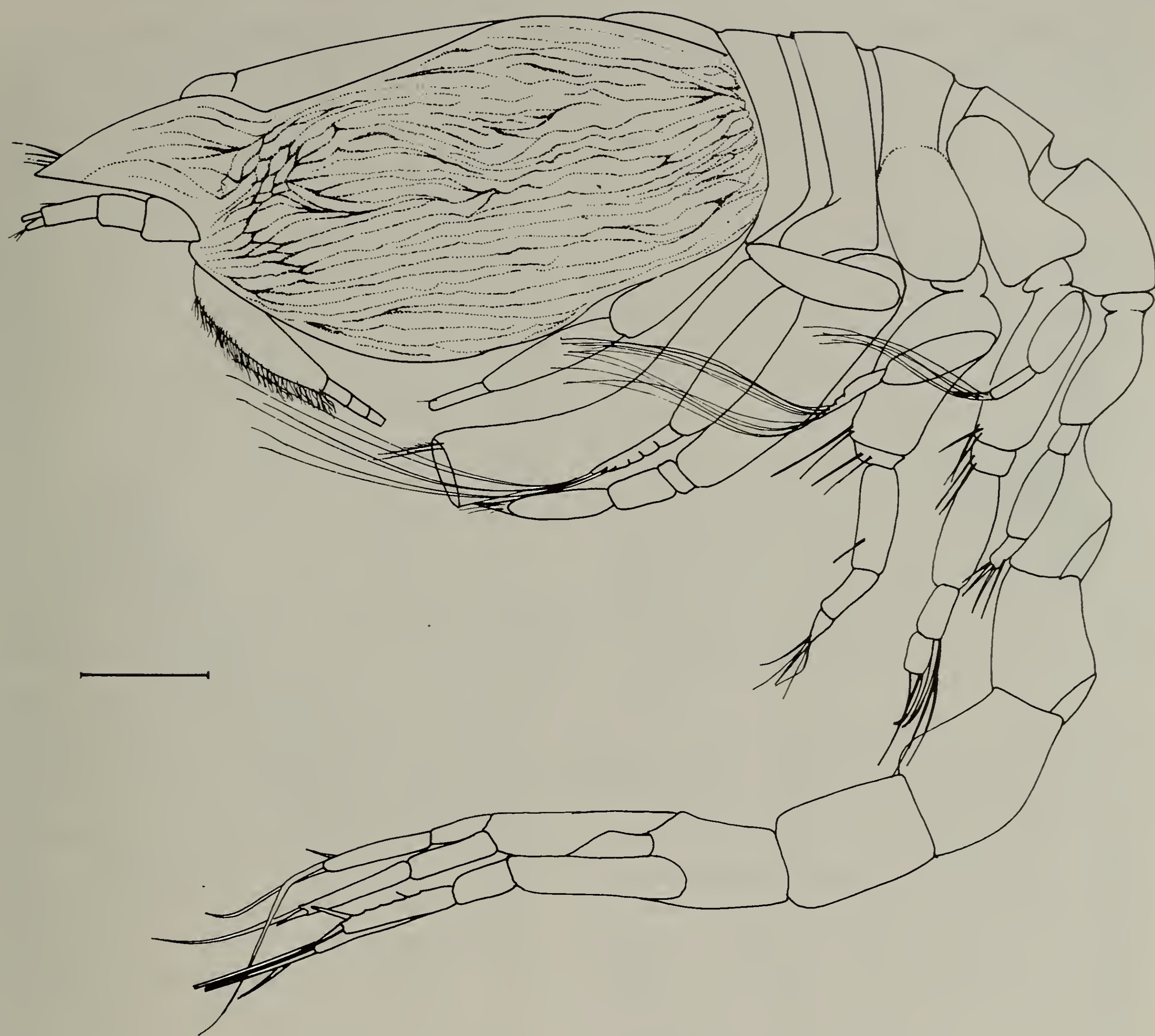

Fig. 1. *Gynodiastylis jazdzewskii*, n. sp. Lateral view of male holotype. Scale = 0.2 mm.

mented; pseudorostrum strongly developed, acutely pointed, slightly decurved, extending well beyond ocular lobe. Antennal notch broad, not defined ventrally by sharp tooth. Thoracic somites 3–5 as illustrated (Fig. 1). Abdomen (Fig. 1) subequal in length to carapace; somites of similar length. Telson (Fig. 2J) linguiform, distinctly longer than sixth abdominal (telsonic) somite, extending to distal ¾ of uropodal peduncle, armed with 2 distinct, closely set, terminal spine-setae. First and second antennae (not dissected), appearing similar to those of other described members of genus. Mandible (Fig. 2A): with well developed incisor and molar. First maxilla (Fig. 2B): outer endite with 14 terminal or subterminal, stout, spine-setae. Second maxilla (fig. 2E): characterized by well-developed, stout comb setae. Maxilliped 1 (Fig. 2D): branchial lobe (not illustrated) lacking branchial processes; siphon long, twisted distally, terminating in bent acute tip; endopod with well-developed specialized setae and spine-setae on inner plate, coxa, and propodus (Fig. 2D, enlargements). Second maxilliped (Fig. 2C): carpus nearly twice as long as propodus; propodus more than twice as long as dactyl; dactyl terminating in 3 well developed, simple spine-setae. Third maxillipeds: lost. Pereopods 1–4: bearing exopods, exopods decreasing in size posteriorly

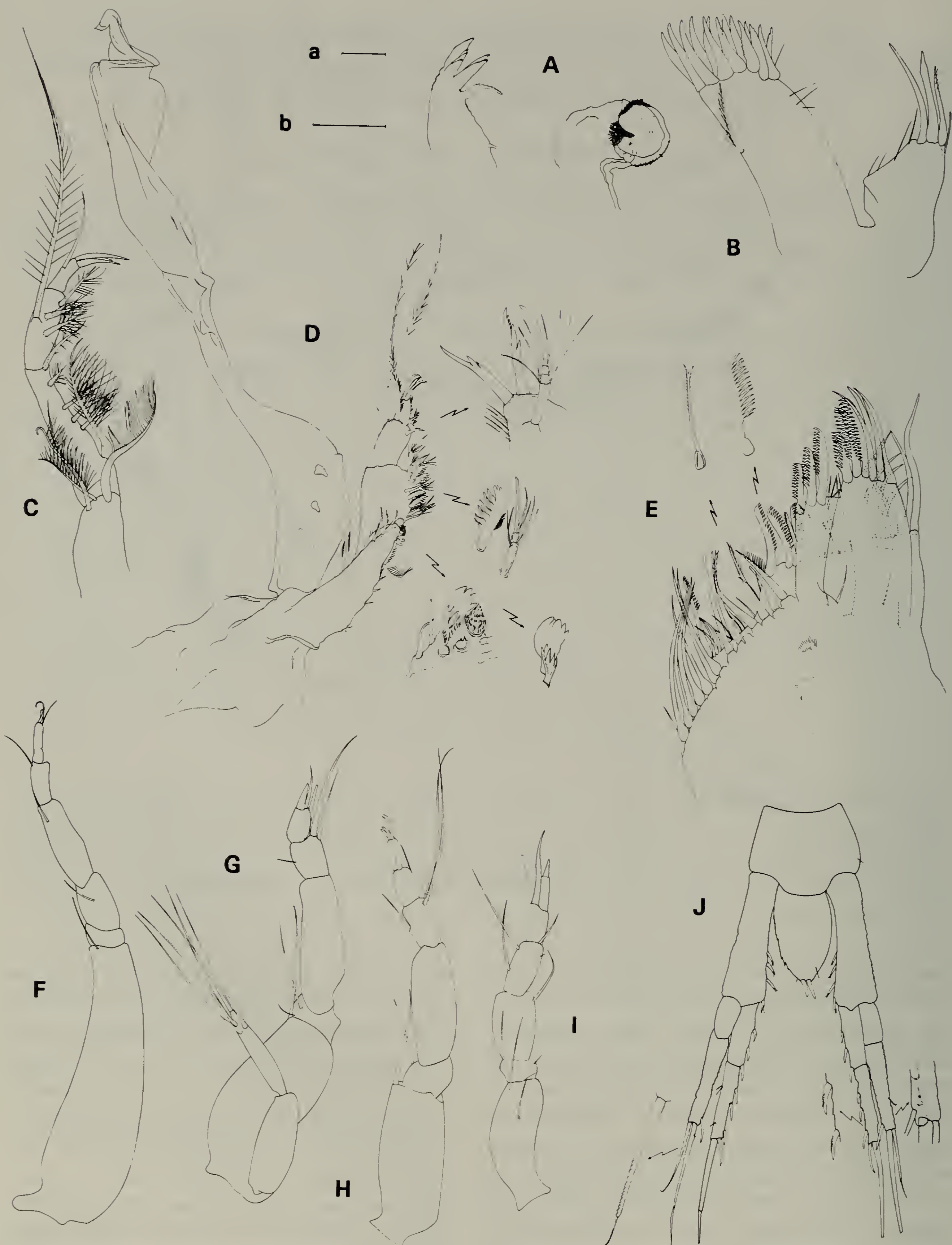


Fig. 2. *Gynodiastylis jazdzewskii*, n. sp. A, left mandible: incisor (on left), all spine teeth, except distal most broken off; molar (on right); B, first maxilla; C, second maxilliped (terminal articles); D, first maxilliped (excluding damaged branchial lobe) showing enlargement of setal types; E, second maxillia F, second pereopod (exopod not shown); G, third pereopod; H, fourth pereopod (exopod not shown); I, fifth pereopod; J, sixth abdominal (telsonic) somite, uropods, and telson. Scale a = 0.1 mm for F, G, H, I; Scale b = 0.3 mm for A, B, C and 0.1 mm for J.

(Fig. 1). First pereopod (Fig. 1) damaged, only basis present; basis strongly developed, extending anteriorly past midlength of carapace, nearly as long as entire second pereopod. Second pereopod (Fig. 2F), basis subequal to combined length of other articles; ischium distinguishable; carpus longer than merus; propodus subequal in length to dactyl. Third pereopod (Fig. 2G), merus well developed, subequal in length to basis; carpus approximately as long as propodus, nearly as wide as long with 3 well developed distal setae, 1 extending to tip of dactyl and 2 extending well beyond dactyl; dactyl about as long as propodus. Fourth pereopod (Fig. 2H) similar to third, but having more slender carpus. Fifth pereopod (Fig. 2I), basis relatively short, subequal in length to combined lengths of ischium, merus, and carpus; merus broad, slightly longer than carpus; carpus longer than propodus; propodus with long, stout, distal seta extending well past dactyl; dactyl shorter than propodus. Uropods (Fig. 2J): relatively long, approximately equal to combined length of abdominal somites 5 & 6, attenuated; peduncle with 4 spine-setae along inner distal margin; inner ramus with 2 articles, longer than outer ramus, proximal article with inner margin bearing 3 spine-setae, distal article longer than proximal, inner margin with 3 spine-setae, 2 terminal setae present, outer seta distinctly longer than distal article and over 4 times longer than inner seta; outer ramus with 2 articles, distal article with one relatively short subterminal seta on inner margin and 2 long terminal setae, innermost approximately as long as rest of exopod, outer seta about ⅔ length of inner.

*Etymology.*—This species is named in honor of Professor Krzysztof Jażdżewski (University of Łódź, Poland) in recognition of his many significant contributions to Antarctic biological research.

*Comparisons.*—*Gynodiastylis jazdzewskii* can be distinguished from the previously described species of the genus by the fine, irregularly wavy, longitudinal ridges on the carapace, the shape and terminal setation of the telson, the relative length of the telson in relation to that of the last abdominal somite and the uropodal peduncles; and by the setation and relative length of the uropodal rami.

Of the known species of *Gynodiastylis*, four (*G. costata* Calman, 1911; *G. turgida* Hale, 1928; *G. lata* Hale, 1946; *G. lineata* Day, 1980) have carapaces with longitudinal ridges or striations. Of these, *G. jazdzewskii* appears to be most closely related to *G. costata*, the only other member of the genus having numerous, fine, irregular striations on its carapace. *Gynodiastylis costata* was originally described from Gulf of Siam at depths ranging from 9 to 37 m. It was later reported from "night surface plankton" in Japanese waters by Gamô (1968).

*Gynodiastylis jazdzewskii* is readily distinguishable from the comparable males of *G. costata* sensu Calman (1911) and Gamô (1962) by having: (1) a longer and more acutely tipped rostrum, (2) a distinctly longer telson (approximately ¾ the length of the uropodal peduncle), and (3) two long terminal setae on the tip of uropodal exopod. Based on Calman's (1911) and Gamô's (1962) descriptions and illustrations (plate 36, figs. 1–10 and fig. 40, respectively) the telson of male *G. costata* is half or less the length of the uropodal peduncle. There is only a single long inner terminal seta on the uropodal exopod of *G. costata*, the outer terminal seta being weakly developed (less than ⅕ the length of the inner).

The variously modified peduncular articles of the first antennae of *Allodiastylis* Hale, 1936 and *Sheardia* Hale, 1946 distinguish *G. jazdzewskii* from the species of these two genera. The presence of uropodal endopods with two articles distinguishes *G. jazdzewskii* from the species of the genus *Dicoides* Hale, 1946, which are characterized by uropodal endopods with three articles. The members of the remaining two gynodiastylid genera, *Halina* Day, 1980, and *Zimmeriana* Hale, 1946, all lack the fine, longitudinal, carapace ridges that characterize *G. jazdzewskii.*

*Discussion.*—In her revision and reinstatement of the family Gynodiastylidae, Day (1980) recognized six genera, *Gynodiastylis*, *Allodiastylis*, *Dicoides*, *Haliana*, *Sheardia*, and *Zimmeriana*. Based on the summary works by Day (1980) and Băcescu (1992), records for all previously described gynodiastylids appear to be confined to the Indo-West Pacific region between 40°N (Japan) and 43°S (New Zealand).

Because present day gynodiastylids have predominantly tropical and temperate distributions, *G. jazdzewskii* might represent a relic species whose ancestral stock was present in cold Antarctic waters before the break up of Pangaea over 180 million yr ago. Based on its similarity to other warmer water species like *G. costata*, *G. jazdzewskii* could have split off from the same stock that gave rise to the rich present day gynodiastylid fauna. Following this reasoning, present day gynodiastylids may have evolved from a small group of cold water, Antarctic progenitors and then underwent rapid speciation and dispersal as Australia and South Africa slowly drifted northward into the warmer latitudes. There, however, are some problems with this hypothesis. For example, if the origin of gynodiastylids was the cold water of the Antarctic Ocean, their apparent absence from continental waters of South America is puzzling. Recently, however, Les Watling (pers. comm) informed us that he has collected gynodiastylids from waters off Chile.

There is the additional possibility that, due to their small size and specialized habitat requirements, the lack of previous records for the family in Antarctic waters also may be due to an artifact of sampling. However, if populations of gynodiastylids are common in the shelf waters of Antarctica, at least some additional specimens should have been collected in studies conducted in the waters adjacent to the Antarctic Peninsula. There has been considerable benthic sampling in this region, and the cumaceans from the resulting collections have been identified (Lowry 1975, Richardson & Hedgpeth 1977, Ledoyer 1993, Błażewicz & Jażdżewski 1995, R. Heard, personal observations).

A third plausible option is that gynodiastylids originated in the warm temperate waters of the Indo-Pacific (Day 1980). If so *G. jazdzewskii* might simply be a pioneer species, representing a relatively recent and isolated dispersal event for the family in Antarctic waters.

The occurrence of *G. jazdzewskii* at a depth between 388 and 399 m represents the second deepest record for the genus and family. A southern African species, *G. profondus* Day, 1980, was reported from depths of 68 to 680 m by Day (1980).

The description of any new species, based on a single damaged specimen, is tenuous. Notwithstanding, *G. jazdzewskii* is readily distinguishable from all previously described gynodiastylids and represents an important zoogeographic record for the family in Antarctic waters.

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## Literature Cited

Băcescu, M. 1992. Cumacea II (Fam. Nannastacidae, Diastylidae, Pseudocumatidae, Gynodiastylidae, et Ceratocumatidae)—Crustaceorum Catalogus, Pars 8, H.-E. Gruner and L. B. Holthuis, eds., SPD Academic Publishing, The Hague. pp. i–iv, 175–468.

Błażewicz, M., & K. Jażdżewski. 1995. Cumacea (Crustacea, Malacostraca) of Admiralty Bay (King George Island, South Shetlands): a preliminary note.—Polish Polar Research 16(1–2): 71–85.

Calman, W. T. 1911. On new or rare Crustacea of the order Cumacea from the collection of the Copenhagen Museum. II. The families Nannastacidae and Diastylidae.—Transactions of the Zoological Society of London 18:341–398.

Day, J. 1980. South African Cumacea. Part 4. Families Gynodiastylidae and Diastylidae.—Annals of the South African Museum 82(6):187–292.

Gamô, S. 1962. On the Cumacean Crustacea from Tanabe Bay, Kii Peninsula.—Publications of the Seto Marine biological Laboratory 10(2):10–66.

———. 1968. Studies on the Cumacea (Crustacea, Malacostraca) of Japan, part III.—Publications of the Seto Marine biological Laboratory 16(3): 147–192.

Hale, H. M. 1928. Australian Cumacea.—Transactions of the Royal Society of South Australia 52:31–52.

———. 1936. Cumacea from a South Australian reef.—Records of the South Australian Museum 5(4): 404–438.

———. 1945. Australian Cumacea. No. 11. The family Diastylidae, part 1.—Transactions of the Royal Society of South Australia 69:173–211.

———. 1946. Australian Cumacea. No. 12. The family Diastylidae, part 2 *Gynodiastylis* and related genera.—Records of the South Australian Museum 8:357–444.

Lowry, J. K. 1975. Soft bottom macrobenthic community of Arthur Harbor, Antarctica.—Antarctic Research Series 23:1–19.

Richardson, M., & J. W. Hedgpeth 1977. Antarctic soft-bottom macrobenthic community adaptations to cold stable, highly productive, glacially affected environment. pp. 181–196 *In* G. A. Liano, ed., Adaptations within Antarctic ecosystem.—Proceedings SCAR Symposium on Antarctic Biology, Smithsonian Institution, Washington.